

REMARKS

Applicants appreciate the Examiner's thorough consideration provided the present application. Claims 1, 2, 4, 6-10 and 12-20 are now present in the application. Claims 17-20 have been added. Claims 1 and 9 are independent. Reconsideration of this application, as amended, is respectfully requested.

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 2, 4, 6, 9, 10 and 12-16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over von Gutfeld et al., U.S. Patent No. 6,055,035 (hereinafter "Gutfeld"), in view of Nagato et al., U.S. Patent No. 5,619,234 (hereinafter "Nagato"). Claims 7 and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Gutfeld in view of Nagato, and further in view of Masazami et al., U.S. Patent No. 6,331,884 (hereinafter "Masazami"). These rejections are respectfully traversed.

Complete discussions of the Examiner's rejections are set forth in the Office Action, and are not being repeated here.

In light of the foregoing amendments, Applicants respectfully submit that these rejections have been obviated and/or rendered moot. While not conceding to the Examiner's rejections, but merely to expedite prosecution, as the Examiner will note, independent claim 9 has been amended.

Independent claim 1 recites a combination of steps including "applying an on voltage to a resonator during emitting of the liquid crystal material to generate a vibration so as to apply a pressure to the projecting portion to emit the liquid crystal material from the projecting portion."

Independent claim 9 has been amended to recite a combination of elements including “a resonator for generating a vibration upon application of an on voltage to the resonator during emitting of the liquid crystal material” and “a resonating plate located between the resonator and the projecting portion for transmitting the vibration to the projecting portion so as to apply a pressure to the projecting portion to emit the liquid crystal material from the projecting portion.”

Applicants respectfully submit that the combinations of steps and elements as set forth in independent claims 1 and 9 are not disclosed or suggested by the references relied on by the Examiner.

The Examiner in his Advisory Action dated June 14, 2006 alleged that Nagato's Embodiment 5 discloses that the ink droplet is ejected from the slit 42 by the applied pressure from the resonator. Applicants respectfully disagree.

In particular, Nagato discloses:

As can be seen from FIG. 8, the ink-ejecting slit 42 of the ink-jet recording apparatus is similar to its counterpart of Embodiments 1 to 4. Counter electrodes 41 are arranged in the slit 42. This apparatus is characterized in that a piezoelectric element 43 is adhered to the top of the substrate which is a component of an ink-holding section 44. The piezoelectric element 43 is electrically connected to a pulse generator 45. When a pulse is supplied to it, the piezoelectric element 43 bends inwardly, deforming the substrate of the ink-holding section 44 inwardly. A pressure is thereby exerted on the ink contained in the section 44, forming an ink meniscus which has a surface convex toward outside from the ink-ejecting slit 42. The ink meniscus grows into an ink droplet, which is ejected forward from the slit 42. Other droplets are successively formed and ejected, one after another, as long as the voltage of the pulse remains high. When the pulse voltage falls to a reference value, the substrate of the ink-holding section 44 restores to its original shape, applying a negative pressure on the ink. The ink ejection is thereby forcibly terminated. The ink ejection is thereby forcibly terminated. Since vibration of presser is externally applied to the ink in the ink-holding section 44, the initiation and termination of the ink ejection can be accomplished with high controllability. (col. 13, lines 12-34; emphasis added.)

The Examiner in his Advisory Action seemed to take the position that Nagato's embodiment 5 simply uses the applied pressure on the ink in the section 44 to eject the ink. Although Nagato discloses applying a pressure on the ink in the section 44, the pressure is merely used to form the ink droplets to be ejected, not to eject the ink droplets as suggested by the Examiner. In fact, *the ink droplet is ejected by the electric field between the electrostatic image formed on the recording medium and the counter electrode 41* (see Abstract). Without applying the electric field to the ink droplets between the recording medium and the counter electrode 41, the ink droplets will not be ejected. Although Nagato discloses that the application of the pressure to form the ink droplets may control the initiation and termination of the ink ejection (because when no pressure is applied, the ink droplets are not formed and therefore cannot be ejected even when the electric field is applied), the pressure simply facilitates the formation of the ink droplets and has nothing to do with the ejection of the ink droplets.

In addition, *if the pressure were able to eject the ink droplets, then there would be no reason for Nagato to use the counter electrode 41 in the section 44 in Embodiment 5*, because the counter electrode in Nagato's Embodiments 1-4 are simply used to form the electric field between the recording medium and the counter electrode *in order to eject the ink droplets*. Nagato further discloses that *the ink ejecting slit 42 is similar to its counterpart of Embodiments 1-4* as shown in FIGs. 1-7. In other words, the counter electrode 41 in the section 44 in Embodiment 5 performs the same function as the counter electrode in Embodiments 1-4 of Nagato, *i.e.*, forming the electric field between the recording medium and the counter electrode to thereby eject the ink droplets.

In particular, as disclosed in Embodiments 1-4 in FIGs. 1-7 and col. 8, line 22- col. 12, line 67 of Nagato, the recording head 3 applies a voltage on the surface of the pyroelectric layer 22 or dielectric layer 25, which will form an electrostatic latent image on the recording medium 2. In addition, a pulse voltage of reverse polarity will be applied to the common electrode 14 (and to the counter electrodes 15, which are connected to the common electrode 14) in synchronization with the pulse voltage supplied to the recording head 3. Because of the electric field between the electrostatic image formed on the recording medium 2 and the counter electrodes 15, the ink droplets are ejected through the slit toward the surface of the recording medium 2, on which the electrostatic latent image has been formed. Nagato also discloses “it is the *electrostatic latent image on the recording medium that determines whether to eject ink or not*” (see col. 7, lines 55-57; emphasis added).

In other words, *the pressure generated by the piezoelectric element 43 is simply used to grow the ink droplets, but not used to eject the ink droplets*. Since the electrostatic latent image on the recording medium determines whether to eject ink or not, by *simply applying the pressure alone* without the electric field between the electrostatic image formed on the recording medium and the counter electrodes, *the ink droplets will not be ejected*.

In addition, if Nagato's ink droplets were ejected by a force other than the force of electric field, the ink droplets may not go to the desired location (*i.e.*, the electrostatic latent image) on the recording medium. In other words, without the electric field, Nagato's ink printing will not work at all because the ink droplets may be ejected onto the undesired locations where the ink should not be printed.

Therefore, Nagato fails to teach “applying an on voltage to a resonator during emitting of the liquid crystal material to generate a vibration so as to *apply a pressure to the projecting portion to emit the liquid crystal material from the projecting portion*” as recited in claim 1 and “a resonator for generating a vibration upon application of an on voltage to the resonator during emitting of the liquid crystal material” and “a resonating plate located between the resonator and the projecting portion for transmitting the vibration to the projecting portion so as to *apply a pressure to the projecting portion to emit the liquid crystal material from the projecting portion*” as recited in claim 9.

With regard to the Examiner’s reliance on Masazami, this reference has only been relied on for its teachings related to some dependent claims. This reference also fails to disclose the above combinations of steps and elements as set forth in independent claims 1 and 9. Accordingly, this reference fails to cure the deficiencies of Gutfeld and Nagato.

Accordingly, none of the references relied on by the Examiner individually or in combination teach or suggest the limitations of independent claims 1 and 9. Therefore, Applicants respectfully submit that independent claims 1 and 9 and their dependent claims (due to their dependency) clearly define over the teachings of the utilized references.

Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103 are respectfully requested.

Additional Claims

Additional claims 17-20 have been added for the Examiner's consideration.

Applicants respectfully submit that claims 17-20 are allowable due to their respective dependence on independent claims 1 and 9, as well as due to the additional recitations included in these claims.

Favorable consideration and allowance of additional claims 17-20 are respectfully requested.

CONCLUSION

All the stated grounds of rejection have been properly traversed and/or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently pending rejections and that they be withdrawn.

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

In the event there are any matters remaining in this application, the Examiner is invited to contact the undersigned at (703) 205-8000 in the Washington, D.C. area.

Pursuant to the provisions of 37 C.F.R. §§ 1.17 and 1.136(a), the Applicants hereby petition for an extension of two (2) months to June 24, 2006 in which to file a reply to the Office Action. The required fee is enclosed herewith.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Dated: June 26, 2006

Respectfully submitted,

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